PATENT
102055-0008P1

UNITED STATES PATENT APPLICATION

of

Paul Andrew Cronk

for

ADJUSTABLE REFLECTOR DEVICE

SHIELDING DEVICE

Background of the Invention

This invention relates to improvements in devices for reflecting light emitted by artificial sources.

Description of the Prior Art

Modern industries requirements for artificial lighting are extensive, varied, and constantly expanding.

Many types of reflector devices associated with artificial illumination of industrial spaces are currently known, but these all require that a fixed shape and/or a fixed lamp mounting position within that shape be precisely specified to create optimal light distribution for a particular purpose. For example, a 'chinaman hat' reflector might commonly be used in a situation where a wide, uniform spread of light is required. In this case, the spreading of light is largely dependant on the fixed internal angle of the cone shaped 'chinaman hat' reflector. The uniformity of light emitted is therefore largely dependant on the non-adjustable lamp positioning within that reflector. These known devices have the disadvantage that their rigid, non-adjustable, designs limit their efficient use to a relatively small range of applications.

The Applicant's related Australian Serial No. 716550 (and foreign equivalents) relates to a novel reflector having adjustable curvature, which overcomes such disadvantages of the prior art.

Horizontally mounted lamps coupled with appropriate reflectors, such as defined in the aforementioned Patent No. 716550, are popular and fulfil industries requirements in most cases, however, their efficiency is limited. The closer these fittings can be placed to the 'target area' the better the overall efficiency and th greater the intensity. However, there comes a point where the intensity and heat of the light beam directly below the lamp (focal hot spot) limits closer placement. In these conditions, addition of a 'heat shield' (as outlined below) can help

redistribute excess light and heat from the 'hot spot' to other areas below the reflector, dramatically increasing uniformity, functionality and efficiency in these extreme applications. This heat shield is superior to prior art because it relies only on direct reflection toward a target area below the lighting fixture. It does not reflect substantial quantities of radiation back towards the lamp and reflector for (inefficient) re-reflection. Hence, the function of the heat shield is totally separable from that of the reflector it is coupled with, not limiting it to use in conjunction with any specific reflector design.

Sub C Cont

Summary of the Invention

The present invention seeks to provide an adjustable reflecting device which overcomes the disadvantages of the prior art.

In one broad form, the present invention provides a shielding device adapted to be disposed about at least part of a lighting means, said device being substantially V-shaped and perforated.

Preferably, said device is adapted to be attached to a lamp socket or lamp bracket of said lighting means.

Preferably, said device is positioned on the opposed side of said lighting means relative to a reflector device associated with said lighting means.

In a preferred form, said shielding device acts to at least partly deflect heat and/or light emitted from said lighting device, to thereby control the amount and lateral spread of radiation emitted directly from said lighting means.

In a preferred embodiment, the nature and/or extent of perforation of said shielding device is predetermined to control the amount of radiation deflected by said shielding device.

Preferably, said perforations are embodied in a patterned manner, such as in rows or the like.

In a preferred form, radiation deflected from said device is transmitted away from said reflector device.

Preferably, said reflector device has adjustable curvature.

Also preferably, said reflector device has a double parabolic shape.

In a preferred embodiment, the ends of the device are shaped such that the overall shape of the device is 'house roof' shaped.

In a further board form, the present invention provides a method of controlling the nature and/or extent of radiation emitted from a lighting source, by using a shielding device as hereinbefore defined.

Brief Description of the Drawings

The present invention will become more fully understood from the following description of a preferred but non-limiting embodiment thereof, described in connection with the accompanying drawings, wherein:

FIG. 1 shows a preferred embodiment of the shielding device in accordance with the present invention;

FIG. 2 shows an alternatively preferred embodiment of the shielding device of the invention;

FIG. 3 shows an exploded view of one example of an adjustable reflector device used in conjunction with the shielding device of the present invention;

FIG. 4 shows a disassembled view of the skin of the reflector device of FIG. 3, depicting the transversely protruding skirts, present on sheet members;

FIG. 5 shows an assembled view of the skin of the reflector device of FIG. 3 prior to

flexing, depicting the transverse alignment of sheet members;

FIG. 6 illustrates the incident and reflected electromagnetic radiation when a double-parabolic reflector is used without a shielding device; and,

FIG. 7 illustrates a similar depiction to that of FIG. 6, but when a shielding device, in accordance with the present invention is used.

Sub C1 Cont

Detailed Description of the Preferred Embodiment(s)

Throughout the drawings, like numerals will be utilised to represent similar features, except where expressly otherwise indicated.

Also, throughout the specification, the term "a double parabolic" is utilised to describe the shape of a reflector device when it is in its flexed position, and retained against the bias of it's normal resilience, as for example, shown in Fig. 3 of the drawings. In considering this definition, it should be appreciated that any size, shape or width of double parabolic or similar shape should be considered to fall within the scope of this definition.

The present invention provides a shielding device, which is substantially V-shaped and perforated, and which is used in association with a reflector device. A preferred arrangement of a reflector device which may be used, is adjustable light reflector device having a resilient reflective skin, flexed to form a double parabolic shape, which is held in place against its resiliency by adjustable retainers located at each end of the skin and an independently adjustable lamp mount which attaches to the skin when it is in the retained position.

Referring to FIG. 1, there is shown a shielding device 17, which is generally V-shaped, which may be attached to a lamp fitting or lamp socket by means of an attachment means 28. The attachment means 28 is shown embodied as a cylindrical sleeve, which may be secured by a grub screw 19 to the lamp fitting or lamp socket. An arm 29 connects the attachment means 28 to the shielding device 18. The shielding device 17 is provided with perforations 30, which will allow the transmission of some radiant emissions therethrough, whilst other radiant emissions will be reflected by the surface of the shielding device, as will be further detailed

hereinafter. The sizing, spacing, patterning, etc., of the perforations will control the amount of radiation which is transmitted past the device 17, through the perforations 30, and that which is reflected by the device 18, and can thus be predetermined depending upon the amount of radiation required according to the application, the type of reflector used, etc.

Referring to Fig. 2, there is shown an alternative, but also preferred, embodiment of the invention. In the embodiment of Fig. 2, the reflector may also be described as V-shaped, but it's ends are also pitched, somewhat resembling a 'house-roof' shape. The shielding device 17 of Fig. 2 will disperse light and heat in four directions from the 'hot spot'. That is, the radiation will be reflected left, right, forward and behind the emission source, such as exemplified in Figs. 8(a) to 8(b), which will be described hereinafter. The embodiment of Fig. 2 also shows an alternative embodiment of an attachment means 28, in this case, the attachment means 28 includes a bolt-on-bracket arrangement.

Referring to FIG. 3 it can be seen that a preferred embodiment of adjustable reflector device used in conjunction with the shielding device of this invention includes a two piece resilient skin formed by two members 1 and 2, having a protruding skirt parallel with the longest edge thereof. The sheet members are substantially rectangularly shaped sheet, detachably joined about a spine portion 3 then flexed back against its normal resilience to produce a double parabolic shape, as shown, such that one edge and associated skirt of one sheet member fits neatly inside the corresponding skirt and edge of the other. The sheets are then fixed together and flexed back to achieve a curved shape, such as a double-parabolic shape. The skin may be made of any suitable material such as colour bonded metal, metal, fibreglass, or plastic. The pair of sheet members could be integrally manufactured in a one piece construction - as opposed to being separately formed. These sheets are adjustably secured by a pair of chain 4 and hook 5 retainers (only one retainer shown because of orientation). The retaining means may be a chain, wire or like means, optionally adjustable in length. A pair of threaded bolts 6 and 7 pass down through holes 8 and 9 in the top of the assembled skin and are secured by nuts 10 and 11.

A lamp mount 12 attaches to bolts 6 and 7 through holes 13 and 14 and is adjustably secured by attaching nuts 15 and 16. The lamp mount comprises a sliding plate that adjusts along a pair of threaded bolts which pass through holes in the skin. Nuts are used to secure bolts to the skin and to provide a means of adjustment for the sliding plate. The luminair mount may be designed in any fashion, adjustable or non-adjustable, so long as it does not substantially inhibit flexibility of the skin when attached thereto.

The V-shaped perforated heat shield 17 slides onto the lamp fitting 18 and is secured to the underside thereof by a grub screw 19. The heat shield is preferably provided about at least part of the element or filament portion of the lighting means, and is attached via a slender arm, to a piece of cylindrical tube which slides onto the lamp fitting and is secured with a grub screw. The heat shield may be perforated with any number of holes of any size or shape so long as it is substantially V-shaped. It may attach to the lamp fitting by any method capable of securing the shield parallel to the under side of the lamp. Folds at 20 and 21 produce rigidity and strength in the flexed and retained skin. The resilient reflective skin may comprise one or any number of sheet members and any necessary reinforcing members fashioned so as to approximate the predefined shape and conditions required for formation of a flexible double parabolic shape as herein defined.

Referring to FIG. 4 it can be seen that sheet members 1 and 2 which form the skin, each have two folds 20, 22 and 21, 23 which create associated skirts 24, 25 and 26, 27.

Referring to FIG. 5 it can be seen how sheet members 1 and 2 are joined at a transverse angle. Skirts 27 and 25 attached to the bodies of sheet members 1 and 2 to create a reinforced joint about the newly created spine 3.

By appropriate adjustment of the reflective device described above, many and varied desirable conditions of artificial illumination may be achieved. Hence the need to employ more than one reflective device to efficiently service a range of discrete tasks may be reduced or abolished.

It will be realised that the reflector device according to this invention is not restricted to the specific shape and construction of the resilient skin shown in the example, but may use a skin fashioned from one, two, or more pieces of suitable material of any suitable shape or size so long as the essential feature of being flexed back against a spine or axial crease to create an adjustable double parabolic shape or other similar shape is achieved.

Referring to Fig. 6, a double-parabolic shaped reflector device is shown in cross-section, to illustrate the incident and reflected radiation associated with such a reflector from a light source positioned thereunder. Incident light I is shown being transmitted from the light source. Some of this incident light travels towards the reflector and is reflected as reflected light R, according to the general principle that the Angle of Reflection equals the Angle of Incidence. The double parabolic shaped reflector shown in Fig. 6 is a special shape so far as reflection is concerned, in that it does not reflect any heat or light back towards the light source or bulb, or create any 'left to right' or 'right to left' cross reflection, which is very inefficient.

Fig. 7 illustrates a diagram similar to that of Fig. 6, but in which a shielding device 17 in accordance with the present invention is used. In the illustrated arrangement, incident light passing through the shielding device 17 is represented as I_h, whilst light reflected by the shielding device is represented as R_h. Using the double parabolic shaped reflector, as shown in Fig. 7, in conjunction with the heat shield 18, cannot produce any re-reflection of any substantial quantity. It is considered that re-reflection would still be minimal in the event that a non-parabolic reflector is used.

It will be appreciated by persons skilled in the art that variations and modifications may be made to the shielding device of the present invention, whilst still achieving the functional advantages of the described embodiments. As such, variations to the shape, the nature and extent of the perforations, the means of attachment, etc., should all be considered to fall within the scope of the invention as hereinbefore described and as hereafter claimed.